C3.2.6 Superstructures

C3.2.6.1 Type and span

C3.2.6.1.1 CCS J-series

C3.2.6.1.2 Single-span PPCB HSI-series

C3.2.6.1.3 Two-span BT-series

C3.2.6.1.4 Three-span PPCB H-series

C3.2.6.1.5 Three-span RSB-series

C3.2.6.1.6 PPCB

Preliminary haunch for all Prestressed Beam Bridges

Note: The calculations provide a haunch thickness estimate (X) value, which does not include the nominal haunch thickness.

$S := 111.5 ft$ Longest Span (feet)

$e := 0.03$ Superelevation (feet/feet)

$G_1 := -1.68$ Grade 1 vertical curve [+ increasing, - decreasing] (%)

$G_2 := 2.10$ Grade 2 vertical curve [+ increasing, - decreasing] (%)

$A := \frac{G_2 - G_1}{100}$ $A = 0.038$

$L := 984 ft$ Length vertical curve (feet)

$D_c := 1.75 deg$ Degree of Horizontal Curvature (degree)

$C := 0.337 ft$ Final Beam Camber (feet) - From prestressed concrete beam standards

$D := 0.19 ft$ Dead load deflection - Elastic + 1/2 Plastic (feet) - From prestressed concrete beam standards

$T := 1.667 ft$ Top flange width (feet)

X = Haunch estimate along the centerline of the beam.

$$X := (C - D) + \frac{S \cdot e}{2} \cdot \left(\frac{1}{\sin\left(\frac{D_c}{2}\right)} - \frac{1}{\tan\left(\frac{D_c}{2}\right)} \right) + \left(\frac{S}{L}\right)^2 \cdot A \cdot \frac{L}{8}$$

$X = 0.219 ft$ $X = 66.894 mm$

$T \cdot e = 0.6 in$

If T * e < 1 then X < 4 in. If T * e > 1 then X < 3 in.

Also check maximum offset for horizontal curve < or = 9 in.

C3.2.6.1.7 CWPG

The table below extracted from the AASHTO LRFD Specifications [AASHTO-LRFD 2.5.2.6.3] can be used as a guide to establish minimum girder depths, when 1/25 of the span is not possible due to vertical clearance or profile grade issues.

Traditional Minimum Depths for Constant Depth Superstructures

Superstructure		Minimum Depth (Including Deck) When variable depth members are used, values may be adjusted to account for changes in relative stiffness of positive and negative moment sections.	
Material	Type	Simple Spans	Continuous Spans
Steel	Overall Depth of Composite I-Beam	0.040L	0.032L
	Depth of I-Beam Portion of Composite I-Beam	0.033L	0.027L
	Trusses	0.100L	0.100L

C3.2.6.2 Width

C3.2.6.2.1 Highway

C3.2.6.2.2 Sidewalk, separated path, and bicycle lane

When placing sidewalks on bridges, the following policy should be used for determining whether to use raised sidewalks or sidewalks at grade.

1. Raised sidewalks, which allow water to drain through slots in the separation barrier curb to the bridge gutterline, shall be used on highway and railroad overpasses.
2. All other situations may use an at grade sidewalk which allows the water to drain over the slab edge.

At grade sidewalks, which drain the water back towards the gutter line, shall not be used. The reason the office would like to avoid this condition is that it would require the exterior girder to be placed higher than the adjacent interior girder. In addition, in situations of excessive rainfall the sidewalks may be temporarily flooded because of water from the roadway. Superelevated bridges may require special considerations. Check with your section leader in this case.

Regardless of the sidewalk type, the top of the slab where the chain link fence is attached shall be made level and drip grooves shall be used on the underside of the slab.

C3.2.6.3 Horizontal curve

C3.2.6.3.1 Spiral curve

C3.2.6.4 Alignment and profile grade

For situations where the profile grade line is not at the centerline of approach roadway, elevations for the bridge deck will be established taking the bridge deck crown into account. The elevations will be noted on the TS&L as “TOP OF BRIDGE DECK AT CENTERLINE ROADWAY IS ‘X’ ABOVE (OR BELOW) THE PROFILE GRADE TO ACCOUNT FOR DECK CROSS SLOPE AND PARABOLIC CROWN.

For situations where the profile grade line is at the centerline of approach roadway, elevations for the bridge deck will be established in accordance with BDM 1.7.1.

C3.2.6.5 Cross slope drainage

C3.2.6.6 Deck drainage

C3.2.6.7 Bridge inspection/maintenance accessibility

C3.2.6.8 Barrier rails

Partially revised: Methods Memo No. 162: Bridge Railing Selection on Interstate and Primary Highways
29 June 2007

A flow chart is reproduced on the next page [BDM Figure 5.8.1.2.1].

Flow Chart for determining Bridge Barrier Rail Height for New Bridges on Interstate and Primary Highways

Revised 5 May 2009